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BUDGETING FOR TEST AND EVALUATION
IN THE DEPARTMENT OF THE NAVY

by

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in the

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ABSTRACT

This thesis examines the Department of the Navy's Research, Development, Test and Evaluation organization, missions, goals, program structure, and budget process, with particular emphasis on the weapons system test and evaluation community. It also examines the current and future DoD budget climate, to include overall Defense, DoN, RDT&E, and T&E budget projections through FY1995. The aggregate impact of Congressional budget actions, investment strategies, endstrength reductions, and Defense Management Review initiatives on budgetary planning for Navy T&E activities is described and assessed. As a result of these efforts certain conclusions are made, and general recommendations proposed for future Navy T&E planning and budgeting activities

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I. INTRODUCTION

A. BACKGROUND

In recent months there has been an apparent end to the Cold War and an anticipated emergence of a new world order. The nature of this rapidly changing security environment has enabled the United States to develop a new defense strategy for effectively countering both real and perceived threats to our national security interests. The events of the past year are highly encouraging, particularly with the collapse of communism in Eastern Europe and the dissolution of the Warsaw Pact.

The international forces currently shaping the strategic landscape are:

- Democracy and restructuring in the Soviet Union.
- The unification of Germany.
- The demise of the Warsaw Pact as an effective military organization.
- Increased political and economic unification in Europe.
- Intensified conflicts between historical enemies, now equipped with weapons of mass destruction, and not easily constrained by the current Superpowers. [Ref. 1:p. 1-1]

As a result of the reduced threat of a major conflict with the Soviet Union, there is an opportunity for the U.S. to significantly reduce its military force structure over the

next several years, without jeopardizing the security of the U.S. or its allies. [Ref. 2:p. 3] However, this position should be taken with caution. The Soviet Union still possesses strong military power, including strategic nuclear weapons capability and a sizeable conventional weapons arsenal.

The security objectives of the U.S. remain unchanged. These are: to deter aggression and protect American interests around the world; to be able to respond and defeat military actions which threaten these vital interests; and to maintain combat-ready forces and equipment to respond to Soviet or other regional threats to our national security.

Changes in threat potential allow the U.S. to focus on new defense priorities and resultant force structure under a revised defense strategy. These priorities include: maintaining credible deterrent forces; maintaining a high quality military force; maintaining strong alliances with our allies; continuing efforts to secure arms control agreements; maintaining investment in research and development and a strong technology base from which to develop future weapons systems; maintaining support for nonproliferation of nuclear weapons and the security of sensitive technologies; sustaining and improving intelligence gathering and assessment capabilities; and maintaining the capability to respond to low-intensity conflicts resulting from instability in Third World countries. [Ref. 2:pp. 4-7]

The essential elements of the new military strategy include; strong deterrence of a global, nuclear war; forward deployed forces supported by reinforcements; a system of flexible readiness and response; smarter utilization of our resources, to include emphasis on system upgrades over new programs; technological superiority over our potential adversaries; streamlining the defense structure; and simplifying the acquisition process.

Over the past forty years the trend for research, development, test and evaluation within the Department of Defense has been to maintain a sizeable investment in science and technology base programs. This emphasis was necessary as a means to effectively counter the Soviet threat in terms of quantity of weapons, with high-technology weapons strategically and tactically deployed.

The recent war in the Persian Gulf serves to underscore the payoff in long-term attention to technologically advanced weapons for our armed forces. One recent report states that:

> We field the most technologically advanced weapons in the world. This factor partially offsets the need to match potential adversaries' quantitative advantages. The combination of the technological superiority of U.S. military systems and the result of 40 years of preparation to fight a global war has provided us with the capability to effectively contain and counter regional aggression, as is evident to date in Operations DESERT SHIELD and DESERT STORM. We can ill afford to allow the diminished threat of global war to erode our ability or resolve to maintain this technological advantage; a consistently robust R&D effort is the essential requirement to maintain this edge. [Ref. 1:p. 2-6]

Historically, the DOD has spent approximately 39 percent of its annual resources on investment accounts (RDT&E and Procurement). Of this amount, approximately 30 percent has been allocated to RDT&E programs. Within this category of funding, nearly 60 percent is spent on strategic systems, including strategic defenses.[1]

The FY90 actual budget authority for the National Defense function (050) was $303.3 billion. The DoD-Military function (051) included budget authority of $293.0 billion. For FY92 and FY93 these figures will decline to about $291 and $278 billion, respectively. [Ref. 3:p. 183]

As noted earlier, approximately one-third of defense investment resources have been allocated to RDT&E programs. Actual RDT&E appropriations for FY90 were $120 billion. For FY91 through FY93 the estimated budget authorizations are projected at $102 billion to $111 billion. The 1992 program for Defense is 12 percent below the 1990 program in real dollars, and 24 percent below the 1985 level.[2]

Some defense planners feel that with shrinking budgets, resources should be used to incorporate new technology developments into current system upgrades and procurement, rather than long-term basic and applied research, which may not meet required operational needs. Secondly, with the long

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[1]Ibid., p. 3-1

[2]Ibid.

lead times inherent in developing breakthrough technology that can be incorporated into advanced military hardware, the amount of dollars available to procure end-items of equipment is insufficient to support the mission priorities of the three Services.

B. OBJECTIVES OF THE STUDY

The purpose of this research is to learn more about the process and fiscal climate in which the Department of the Navy plans for and executes its RDT&E budget. This study includes the budget trends, the nature of technology base programs, and the program responsibilities and budget outlook for the Test and Evaluation community. The central issue of this research is to determine how the Navy organizes and manages its investment in test and evaluation (T&E) programs. The primary objectives of the thesis are:

- to gain a better understanding of the current DON RDT&E establishment.
- to explore the funding trends and projections for major RDT&E budget categories.
- to assess the impact of defense reductions, activity consolidation, and management review initiatives on T&E budgets.
- to gain insight into the future of the Navy's T&E investment strategy, budget formulation process, organizational structure and projected resources.

C. RESEARCH QUESTIONS

The most important question which the author wants to answer is: How does the Navy perform the planning and budgeting functions for test and evaluation, and what factors are currently influencing budget estimates?

Secondary research questions are:

- What has been the DON RDT&E budget trend and what are the projections for the 1990's?
- How does the Navy develop RDT&E budget estimates within the DOD Program, Planning and Budgeting System?
- What will be the impact of DOD endstrength and program reductions on the RDT&E establishment?
- What will be the impact of restructuring Navy laboratories and R&D centers on the test and evaluation mission capabilities?

D. RESEARCH METHODOLOGY

The research involved extensive review of the Navy's RDT&E program elements and the National security objectives and budget climate in which these programs are developed and managed. Emphasis was placed on the organization structure, management hierarchy, investment strategy, and budgeting process. Data on the technology base programs (e.g.; 6.1, 6.2 and 6.3A), advanced development, and test and evaluation programs was obtained from extensive literature research and interviews with designated functional offices and program managers.

The research method also included review of applicable defense policy, program, and budgetary documentation. Defense periodicals, other thesis studies, budgetary data and RDT&E activity briefing papers added to the literature research. This research material proved invaluable in defining the scope and depth of each of the thesis chapters, and in addressing specific research questions.

E. SCOPE

The scope of this thesis is limited to issues concerning the magnitude of the DON RDT&E system, the strategy and budget climate in which it operates, and the driving forces and budget practices which impact the allocation of scarce defense dollars to the various budget categories and authorized programs.

Although there is extensive information available on the total defense RDT&E community, the thesis research was confined to the study of those in-house and university laboratories, R&D centers, and designated test and evaluation field activities that are organized under the Office of the Chief of Naval Research and current Navy systems commands, including SPAWARS. This limitation is applicable to the extent that the majority of science and technology, advanced development, and test and evaluation functions and appropriations are executed within these activity budgets. Additionally, most of the adverse budgetary and planned

restructuring actions will be absorbed by these facilities (e.g., consolidation, DMR actions, budget reductions, and investment goals). There are currently 23 such activities, 14 of which will be discussed in detail.

F. ORGANIZATION OF THE STUDY

This thesis is comprised of six chapters. Chapter I describes the research objectives, pertinent questions, research methodology, and scope of the study. Chapter II provides information on the Navy's RDT&E establishment, the defense technology base, and investment strategy. Chapter III describes the DoD test and evaluation organization and mission, with particular emphasis on the DoN Major Range and Test Facility Base (MRTFB), the Central Test and Evaluation Improvement Program (CTEIP), and the Planning, Programming and Budgeting process. Chapter IV provides a current RDT&E budget overview to include topline funding projections, endstrength reduction, Budget Enforcement Act implications, Defense Management Review (DMR) impact, and current Navy plans for laboratory consolidation. Chapter V provides conclusions and recommendations resulting from the research.

II. RESEARCH AND DEVELOPMENT

This chapter describes the Department of the Navy's research, development, test and evaluation (RDT&E) establishment, program responsibilities, resource categories and current investment strategy. The chapter begins with a description of the Department of Defense (DoD) Science and Technology (S&T) base, research and development program objectives and investment goals. Next is a description of the DoD RDT&E funding categories and current mission-oriented budget activities. Finally, this chapter provides a detailed description of the major Navy laboratories, or research and development centers, which support the S&T base, engineering development and management support.

A. TECHNOLOGY BASE OVERVIEW

The defense technology base is defined as "that combination of people, facilities, capabilities and skills that provide the technology used to develop and manufacture weapons and other defense systems". [Ref. 4:p. 7] Technology base programs represent numerous research and development projects which are funded through the annual budget process, and contribute to the national defense technology base. [Ref. 4:p. 7]

Critics of the DoD Science and Technology program are concerned that "requirements pull" and "technology push" may be out of balance. Some argue that stringent test requirements to validate the relevance of basic research to military applications may be slowing down technological advances. Others contend that funding research and development programs that are not linked to short-term military needs is an inappropriate use of R&D appropriations.[5]

"Requirements pull" refers to the process of organizing research programs such that they are responsive to the user and the situation he will face on the battlefield. Critics contend that this approach dominates the planning process within DoD Science and Technology programs. They believe that technology push is more likely to advance the application of weapon systems that will shape future warfare planning strategies.[6] Examples of this R&D approach would include the Strategic Defense Initiative (SDI), the Tomahawk missile, and laser guided bombs.

Technology push implies the development of upgraded or new technologies to meet a specific warfighting capability. Promising new technologies which may lead to the development of weapons systems that are directly applicable to unique

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[5]Ibid., p. 10-11.

[6]Ibid., p. 31.

services' hardware requirements are then selected for further exploratory and advanced development and prototype testing.

The six major goals of the DOD technology base programs are to:

- Offset Soviet numerical superiority with advanced technological advantage.
- Keep ahead of the growing Soviet threat in terms of technology innovation.
- Reduce weapon systems complexity and life-cycle costs.
- Improve productivity of the defense industrial base.
- Sponsor the highest quality of science and technology work performed in-house and by industry and outside universities.
- Enhance return on the investment in science and technology base programs. [Ref. 4:p. 54]

Navy research and development programs are independently managed within the Office of the Chief of Naval Research (OCNR), who reports to the Assistant Secretary of the Navy for Research, Engineering and Systems (ASN, RE&S). The OCNR is comprised of the Office of Naval Research (ONR), the Office of Naval Technology (ONT), and the Office of Advanced Technology (OAT).[7]

The ONR funds, manages, and oversees the Navy's basic research efforts. This office also supports and oversees the in-house corporate laboratories.[8] The ONT provides for

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[7]Ibid., p. 64-65.

[8]Ibid.

resource planning, management oversight, and investment strategy for the Navy's exploratory development program.[9]

The Director, Research, Development and Requirements (Test and Evaluation) provides management oversight for the Navy's advanced technology demonstration program. The Technology Assessment Office executes the project and resource planning functions for the overall program.[10]

B. INVESTMENT STRATEGY

The Navy's investment strategy is to rely heavily on military requirements input and maintain technological advantage in developing the core and new technologies which may be feasibly carried to exploratory and advanced development, and to near-term developmental and operational test and evaluation. The primary goals of the Navy's basic and applied research programs are:

- to sustain U.S. scientific and technical superiority for Naval power and security.
- to provide a source of new concepts and technical options.
- to support theoretical and experimental research in each directorate.
- to retain a vigorous scientific manpower and laboratory base.

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[9]Ibid., p. 67.

[10]Ibid., p. 70.

- to apply the results of research to Naval warfare and warfare support areas.[11]

The Office of Naval Technology's investment strategy for 6.2 (exploratory development) programs is achieved by developing technologies to:

- keep ahead of the projected threat
- provide affordable system options.
- reduce fleet operating costs.
- avoid technological surprise. [Ref. 5:p. 11]

Investment of resources in the advanced technology demonstration program (6.3A) is prioritized to achieve the following objectives:

- Ensure the availability of technology needed for identified system development and product improvements (system requirements pull).
- Advance the state-of-the-art in technologies that enable warfighting capabilities needed across the full spectrum of potential naval conflicts (capabilities pull).
- Establish technology base for revolutionary new military capabilities (technology push).[12]

C. BUDGET CATEGORIES

RDT&E funding within DOD is budgeted and allocated within six functional categories, numbered from 6.1 to 6.6. The

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[11]Ibid., pp. 65-66.

[12]Ibid., p. 12.

Science and Technology base categories are 6.1, 6.2, and 6.3A. The following RDT&E funding categories apply:

6.1 Basic Research- Includes all scientific study and experimentation directed toward increasing knowledge and understanding in those fields of the physical, engineering, environmental, biological, medical, and behavioral-social sciences related to long-term national security ends. It provides fundamental knowledge for the solution of military problems. It also provides part of the base for subsequent exploratory and advanced development in defense related technologies and of new or improved military functional capabilities in various scientific fields.

6.2 Exploratory Development- Includes all the efforts directed towards the solution of specific military problems, short of major development projects. This type of effort may vary from fundamental applied research to quite sophisticated breadboard hardware, study, programming and planning efforts.

6.3 Advanced Development- Includes all projects which have moved into the development of hardware for experimental or operational test. It is characterized by line item projects, and program control is exercised on a project basis. The focus of advanced exploratory development lies in the design of items being directed toward hardware for testing of operational feasibility, as opposed to items designed and engineered for eventual service use. There is also a

category 6.3B, which is reserved for advanced strategic development programs.

6.4 Engineering Development- Includes all those development programs being engineered for service use, but which have not yet been approved for procurement or field operation.

6.5 Management Support- Includes research and development effort directed toward support of installations or operations required for general research and development use. Included are test ranges, military construction, maintenance support of laboratories, operations and maintenance of test aircraft and ships, and studies and analysis in support of the R&D program. Most of the laboratory personnel, either in-house or contractor-operated, would be assigned to appropriate projects, or as line items in the Research, Exploratory Development, or Advanced Development program areas, as appropriate. Military construction costs directly related to a major development program will be included in the appropriate element.

6.6 Operational Systems Development- Includes research and development efforts directed toward development, engineering and test of systems, support programs, vehicles, and weapons that have been approved for production and service employment. For convenience and discussion this term is used, even though there is no formal 6.6 program element. [Ref. 4:pp. 54-55]

D. BUDGET ACTIVITY STRUCTURE

In 1978, DoD restructured the RDT&E budget format to become more oriented towards mission areas and the program review process. Congressional committees, the Office of Management and Budget (OMB) and the Secretary of Defense requested that the R&D budget be broken down by Budget Activities (BA), as follows:

- **Technology Base-** For the development of promising technological advances to support development of future defense systems.
- **Advanced Technology Development-** For support of exploration of promising systems alternatives and concepts. This BA represents one of the most important RDT&E program categories currently receiving significant attention and resources. Included are programs on aeronautics and propulsion, flight simulation, biomedical sciences, materials and structures, weapons technology, high-energy lasers and electronics.
- **Strategic Programs-** For assurance that future strategic systems will continue to deter nuclear attacks, as well as coercion through the threat of nuclear attack, against the U.S. and its allies.
- **Tactical Programs-** For provision of new combat systems for general purpose forces of the U.S. and its allies.
- **Intelligence and Communications-** For providing improvements to defense capabilities in intelligence and worldwide communications.
- **Defensewide Mission Support-** For provision of support-type efforts including federal Contract Research Centers (FCRC), ranges and test facilities and studies and analyses. [Ref. 6:pp. 6-7]

E. PROGRAM ELEMENTS

Each program element in the RDT&E program budget consists of five components. The first component refers to the DoD major force program. There are eleven major force programs: Strategic Forces; General Purpose Forces; Intelligence and Communications; Airlift/Sealift; Guard & Reserve Forces; Research and Development; Central Supply & Maintenance; Training, Medical and Other General Personnel Activities; Administration and Associated Activities; Support to Other Nations; and Special Operating Forces.[13] RDT&E program element numbers would begin with the number 6 designation.

The remaining program element code includes the R&D category; equipment/activity type; project serial number; and service designation.

F. DOD RDT&E ESTABLISHMENT

The Department of Defense operates the most extensive and complex research and development laboratory system in the world. The laboratories perform extensive core and emerging technology research in support of military weapons programs. There are 76 DoD research and development laboratories, of which 23 are Navy owned and operated. In FY87, the combined DoD laboratories spent approximately $6.3 billion on RDT&E

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[13]Ibid., p. 2.

programs and employed nearly 60,000 people. Approximately 27,000, or 45 percent, were scientists and engineers.

The three services also operate 30 test and engineering centers, most of which perform specific non-RDT&E related functions, such as flight test of new aircraft and missile system/aircraft interface testing. These activities accounted for an additional $2 billion in FY87, and employed nearly 23,000 people. [Ref. 7:p. 4] These T&E Centers are heavily involved in performing specific mission and developmental testing prior to making procurement decisions or conducting operational test and evaluation by Navy Fleet combatants.

The primary purpose of the laboratories is "to develop new technologies to support each of the respective service's missions".[14] The laboratories also provide the military with the capability to react quickly to resolving immediate critical problems that are experienced by one of the services, either in advance of deployment, or as part of lessons-learned experiences. Other responsibilities of the laboratories include:

- to ensure the maintenance and improvement of national competence in technology areas essential to military needs.
- to avoid technological surprise and encourage technological innovation.

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[14]Ibid.

- to pursue technology initiatives through the planning, programming and budgeting process and allocate work among private sector organizations and government elements.
- to act as a principal agent in maintaining the technology base of DoD.
- to provide material acquisition and operating system support.
- to stimulate the use of technical demonstration and prototypes to exploit U.S. and allied technologies.
- to interface with the worldwide scientific community and provide support to other government agencies.[15]

Almost 40 percent of the laboratories' R&D funding is for technology base activities (e.g., research and exploratory development). In FY87, approximately 40 percent ($2.5 billion) of the DoD RDT&E funding was spent by in-house laboratories. The remaining 60 percent ($3.8 billion) was spent outside the laboratory by defense contractors and federally funded universities.[16]

It is important to know that the individual services operate their own laboratories, in support of a unique set of missions. Although they are commonly known as "DoD laboratories", the three services operate their own research, development and engineering centers. This is important to note in conjunction with SECDEF Cheney's Defense Management Review activities. As part of this program, each of the services has been preparing its own laboratory

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[15]Ibid., p. 4-6.

[16]Ibid., p. 6.

restructuring proposals to respond to defense reductions while maintaining a viable RDT&E capability.[17]

Despite the differences in mission focus and the mix of RDT&E projects, there are some common threads among the functional and technology base programs which these centers support. They are expected to provide the technical expertise which allows the services to invest wisely in new system technology, and become smart buyers of our weapon systems. To varying degrees they all develop technology in-house and externally, with the purpose of transferring it to the procurement system and the test and evaluation establishment.[18]

1. Department of th Navy RDT&E Laboratories

The Navy spends more RDT&E dollars and employs more scientists and technologists than any of the other services. The Navy spent slightly over $9.3 billion in FY87 on RDT&E programs. Approximately 32,000 people are employed in the laboratories, of which over 90 percent are civilians. The Navy laboratory community includes 23 R&D laboratories, eight of which are small medical facilities. In addition, there are several test and evaluation activities and test facilities which support the R&D establishment. Most of these facilities are organized either under the various systems

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[17]Ibid., p. 7.

[18]Ibid.

commands (SYSCOMS), or the Office of the Chief of Naval Research.[19] Table 1 shows the FY92 RDT&E,N budget projections for the 23 Navy laboratories. Recapitulation of the FY90 actual funding showed a combined activities total of $5.0 billion. The aggregate RDT&E portion was nearly $2.7 billion, of which the RDT&E,N budget was $2.5 billion or approximately 91 percent.

2. SPAWAR Laboratories

In the early 1980's, the Secretary of the Navy (SECNAV) disestablished the Naval Material Command (NAVMAT) and distributed acquisition management authority and functions among the Navy's Systems Commands. Management responsibility for the R&D centers was assigned to the newly formed Office of the Chief of Naval Research, under the direction of the Chief of Naval Research (CNR). In 1986, SECNAV reassigned management responsibility for the Navy's R&D centers and university laboratories to the Space and Warfare Systems Command (SPAWAR). This action also vested SPAWAR with the responsibility for warfare system

[19]Ibid., p. 10.

TABLE 1. DON RDT&E PROJECTED FUNDING FOR FY92
(millions $)

ACTY	6.1	6.2	6.3a	6.3B	6.4	6.5	6.6	TOTAL
DTRC	$9.9	$58.5	$7.4	$79.0	$66.6	$15.9	$14.0	$251.3
NADC	3.2	54.0	17.2	106.2	126.1	6.4	40.0	353.1
NCSC	14.9	20.6	3.9	52.5	17.8	5.1	12.4	127.2
NOSC	24.0	69.0	45.0	58.0	70.0	14.0	70.0	350.0
NSWC	14.4	51.4	12.1	95.4	77.3	16.9	24.6	292.1
NUSC	5.1	43.7	9.4	83.6	94.3	50.0	13.4	299.5
NWC	7.5	29.8	5.0	87.8	123.9	94.9	36.2	385.1
APL/JHU	0.9	3.2	60.2	0.0	48.1	2.2	26.7	141.3
APL/UW	9.9	5.1	9.0	0.0	0,6	0.0	0.0	24.6
ARL/PSU	1.0	15.8	0.0	18.6	1.9	0.0	2.8	40.1
ARL/UT	5.4	3.4	16.6	0.0	3.2	0.8	4.6	34.0
NAPC	8.6	0.0	0.7	4.7	21.7	29.0	0.0	64.7
NATC	0.0	0.0	21.7	0.0	109.9	90.7	52.7	275.0
NTSC	0.3	8.0	1.0	0.0	118.0	0.4	0.3	128.0
MWEF	0.0	0.0	0.0	1.9	0.2	3.4	0.0	5.5
PMTC	0.0	2.9	26.8	0.0	53.7	116.7	39.1	239.2
NCEL	1.3	8.1	1.0	3.8	3.5	0.0	0.9	18.6
NEODTC	0.0	4.1	5.6	0.0	5.3	0.6	0.0	15.6
NOMTS	0.0	0.0	1.5	0.0	6.0	0.0	0.0	7.5
NCTRF	0.0	0.7	0.9	0.0	0.0	0.0	0.0	1.6
MPL	2.8	2.3	0.4	0.0	0.0	1.1	0.0	6.6
NOARL	10.9	18.8	3.2	14.5	3.1	4.5	6.0	61.1
NRL	82.7	71.4	3.9	12.1	41.5	5.8	13.6	231.0
% TOTAL	6.1	14.0	7.5	18.4	29.6	13.7	10.7	100.0
TOTALS	202.8	470.8	252.6	618.1	992.7	458.4	357.3	3352.7

Source: Department of the Navy, SPAWAR RDT&E Center Management Briefs, Vols. I-IV, September 1990.

architecture and engineering within the Navy. The Director of Navy Laboratories (DNL) has authority and responsibility for the direction and operations of the seven R&D centers, and oversees the contracts awarded to the university laboratories. This change was proposed to link the R&D centers and university laboratories with the SYSCOMS and provide better organization and control over mission and resource planning and execution.[20]

The SPAWAR R&D centers employ nearly 25,000 civilian and military personnel. Approximately 12,000 are civilian scientists and engineers. The university laboratories employ 2,281 scientists and engineers and are contracted through the separate SYSCOMS.[21]

Overall Navy R&D Center funding (excluding test centers) was approximately $4.3 billion in FY90. About 50 percent of this funding is for the RDT&E appropriation category. The two largest sponsors of the work in these Centers are the Naval Air Systems Command and the Naval Sea Systems Command. SPAWAR and OCNR are also major sponsors, with the latter providing most of the technology base funding.

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[20]Space and Naval Warfare Systems Command, Department of the Navy RDT&E Center Management Briefs, Vol. I, 30 September 1990.

[21]Ibid.

The community of seven RDT&E centers and four university laboratories is composed of the following:[22]

a. David Taylor Research Center (DTRC)

MISSION. The DTRC is the principal Navy RDT&E center for naval vehicles and logistics and provides support to the U.S. Maritime Administration and maritime industry.

PROGRAM WORK. Major programs supported include submarine and surface ship technology and development, manned and unmanned underwater vehicles, warfare assessment and effectiveness, SEAWOLF (SSN 21) technology and design, high-strength, low-alloy (HSLA) materials development, survivability and damage control, and radar signature technology.

PERSONNEL DATA. As of FY90 there were 2668 full-time permanent employees on board, of which 2765 were civilians. This figure includes 1414 scientists and engineers, or approximately 53 percent of the workforce.

FUNDING BY SPONSOR/APPROPRIATION. The total activity appropriations for FY90/91/92 are $404.4 million, $390.4 million, and $402.6 million, respectively. The FY92 planned RDT&E budget for DTRC is $283.1 million, of which $251.3 (89 percent) is RDT&E,N funding.

FUNDING BY CATEGORY. For FY92, planned activity funding for technology base programs (6.1, 6.2, and 6.3A)

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[22]Ibid., Vol. I through IV.

represents nearly 30 percent of the total RDT&E,N appropriation. Of this amount approximately 23 percent is funded for exploratory development. Funding for Advanced Development and Engineering development (Categories 6.3 & 6.4) comprises approximately 58 percent of the total RDT&E,N budget.

b. Naval Air Development Center (NADC)

MISSION. NADC is the principal Navy research, development, test and evaluation center for aircraft, airborne antisubmarine warfare, aircraft systems (excluding aircraft-launcher weapons systems), and surface ship, submarine and aircraft navigation.

PROGRAM WORK. Representative programs supported include the NAVSTAR Global Positioning System and the P-3C and S-3 Orion Aircraft Weapon System. Technology programs include development of composite structures for aircraft, tactical surveillance sonobuoy, and Air Deployed Active Receiver.

PERSONNEL DATA. As of FY90 there were 2768 full-time permanent employees on board, of which 2531 were civilians. Of this workforce, 1560 employees, or about 62 percent, are scientists and engineers.

FUNDING BY SPONSOR/APPROPRIATION. Total activity appropriations for FY90 (actual), FY91 and FY92 (planned) were $405 million, $438 million, and $454 million,

respectively. Of the total FY90 actual resources available, NAVAIRSYSCOM provided $211 million, or approximately 52 percent. The OCNR provided 13 percent of the funding, primarily to support the technology base programs. The total RDT&E, N appropriations for FY90-92 are $284 million, $316 million, and $353 million, respectively. As a percentage of total NADC funding, RDT&E,N funding increases from 70 percent in FY90 to 78 percent in FY92.

FUNDING BY CATEGORY. For FY92, planned funding for technology base programs is $74.4 million. This is about 21 percent of all RDT&E sponsor funding. Funding for advanced and engineering development comprises the larger portion of the R&D effort, with about 65 percent of the funding.

c. Naval Coastal Systems Center (NCSC)

MISSION. NCSC is the principal Navy research, development, test and evaluation center for mine and undersea countermeasures, special warfare, amphibious warfare, diving, and other naval missions that take place primarily in the coastal regions.

PROGRAM WORK. Major program efforts include warfare analysis, research and technology, airborne mine countermeasures, surface ship mine countermeasures, amphibious warfare and strategic sealift, sonar and torpedo countermeasures, and ocean engineering and mechanical

engineering. NCSC also manages the Office of Naval Technology Block programs in torpedo and sonar countermeasures, sea-mine countermeasures, and special warfare.

PERSONNEL DATA. As of FY90, NCSC employed 1428 people, of which 1295 are civilians. There are 674 full-time scientists and engineers assigned to the various programs, most of whom are mechanical and electronics engineers.

FUNDING BY SPONSOR/APPROPRIATION. Total FY90 activity funding (actual) was $198 million. Estimated funding for FY91-92 was $201 million and $205 million, respectively. In FY90, NAVSEASYSCOM provided 44 percent of the funding and OCNR provided another 24 percent. Projected FY92 RDT&E appropriations have risen to nearly 71 percent of NCSC funding. RDT&E,Navy funding comprises 88 percent of all FY92 planned RDT&E funding for NCSC.

FUNDING BY CATEGORY. For FY92, $39.4 million is provided for technology base programs at NCSC. This figure represents about 31 percent of the $127.2 million RDT&E,N budget for NCSC.

d. Naval Ocean Systems Center (NOSC)

MISSION. NOSC is the principal Navy RDT&E Center for Command, Control, Communications, Ocean Surveillance, Surface and Air-launched Weapon Systems, and Submarine Arctic Warfare.

PERSONAL DATA. As of FY90, the total number of on-board personal was 3322, of which 3079 were civilians. There are 1632 scientists and engineers, accounting for approximately 53 percent of the civilian workforce.

PROGRAM WORK. For FY91 their estimated budget of $539 million and 1714 direct work years, distributed among several major areas of work. These include Command and Control, Marine Sciences and Technology, ASW systems, Surveillance, Communications, Engineering and Computer Science, Planning, Intelligence, and Analysis, and Submarine Arctic Warfare.

FUNDING BY SPONSOR/APPROPRIATION. Sponsor allocated resources for FY90 were $593 million. NOSC total activity budget estimates for FY91-92 are $539 million and $551 million, respectively. The FY92 RDT&E budget estimate for NOSC is $551 million, of which $350 million (64 percent) represents RDT&E,N appropriations. For FY92, the SPAWAR, NAVSEA and NAVAIR SYSCOMS and OCNR contribute a combined total of $369 million (67 percent) of all activity funding.

FUNDING BY CATEGORY. FY92 projected funding for technical base programs at NOSC is $138 million. This figure represents about 38 percent of the RDT&E,N budget for NOSC. Advanced development and engineering development comprise another 36 percent of NOSC's RDT&E,N budget.

e. Naval Surface Warfare Center (NAVSWC)

MISSION. NAVSWC is the principal Navy RDT&E Center for surface ship combat systems, ordnance, mines, and strategic systems support.

PROGRAM WORK. Major programs supported include the following: warfare systems (e.g., simulations and wargaming); combat systems (e.g., AEGIS, Tomahawk); strategic systems (e.g., TRIDENT); underwater systems (e.g., QUICKSTRIKE mine system, MK 50 torpedo, and mine neutralization weapons); electronic systems; weapons systems (e.g., vertical launch system, STANDARD MISSILE, guided munitions); technology (e.g., 6.2 block programs to include explosives and warheads, materials, and surface launched weapons).

PERSONNEL DATA. The center has a total of 2532 personnel on board as of FY91, of which 5119 are civilian employees. The 2640 scientists and engineers comprise about 52 percent of the workforce.

FUNDING BY SPONSOR/APPROPRIATION. Actual appropriations for FY90 were $721 million. For FY91-92, the planning estimates are $734 million and $783 million, respectively. NAVSEA provides nearly 45 percent of all resource sponsor funding. The combined RDT&E budget estimate for NSWC in FY92 is $346 million, of which $292 million (nearly 84 percent) is RDT&E,N funding.

FUNDING BY CATEGORY. FY92 estimates for technology base programs constitute about $78 million. This

allocation represents approximately 27 percent of the RDT&E,N budget for NSWC. Advanced and engineering development designated funds comprise approximately 60 percent of FY92 RDT&E,N funding for NSWC.

f. Naval Underwater Systems Center (NUSC)

MISSION. NUSC is the principal Navy RDT&E Center for submarine warfare systems, submarine weapons systems, and surface ship sonar systems.

PROGRAM WORK. Major programs and projects supported include submarine combat systems, submarine weapon and launcher systems, warfare analysis and prediction, surface ship acoustic systems, and test and evaluation.

PERSONNEL DATA. As of FY90, the actual number of on-board personnel was 3644, including 3560 civilian employees. The civilian baseline consists of 2112 scientists and engineers, who comprise about 60 percent of the total technical workforce.

FUNDING BY SPONSOR/APPROPRIATION. The center's FY90 actual funding was $662 million. For FY91-92, the total planned funding for all categories is $636 million and $651 million, respectively. NAVSEA provides approximately 64 percent of total activity resources, with SPAWAR, CNR and NAVAIR providing an aggregate of about 25 percent. The FY92 RDT&E,N budget estimate is $305 million, which is nearly 47 percent of all NUSC funding.

FUNDING BY CATEGORY. For FY92, technology base resources planned are $58.2 million. This estimate represents 20 percent of RDT&E,N funding for NUSC. Funding for advanced and engineering development programs comprise approximately 59 percent of the FY92 RDT&E,N appropriations. Management and Support, to include test and evaluation base support, comprises about 17 percent of the RDT&E,N proposed budget for NUSC.

3. NAVAIR SYSCOM RDT&E Activities

The Naval Air Systems Command manages five unique RDT&E centers. They are the Naval Air Propulsion Center (NAPC), Naval Air Test Center (NATC), Naval Training Systems Center (NTSC), Naval Weapons Evaluation Facility (NWEF), and the Pacific Missile Test Center (PMTC). No detailed discussion of these centers will be presented here. Three of these activities (NAPC, NATC, and PMTC), in addition to being Navy laboratories, are also part of the Major Range and Test Facility Base (MRTFB) and will be discussed in a later chapter. As part of the ongoing Navy laboratory consolidation initiative, NWEF is scheduled to be disestablished as a separate command in 1992.

4. Other SYSCOM Activities

The Naval Facilities Engineering Command (NAVFAC) manages the Naval Civil Engineering Laboratory (NCEL). The

Naval Sea Systems Command (NAVSEA) manages the RDT&E activities of the Naval Explosive Ordnance Disposal Technology Center (NEODTC) and the Naval Ordnance Missile Test Station (NOMTS). The Naval Supply Systems Command (NAVSUP) manages the Navy CLothing and Textile Research Facility (NCTRF).

Notwithstanding a detailed discussion of activity mission and programs managed outside the NAVAIRSYSCOM, some general discussion is warranted. For the combined NAVFAC, NAVSEA, and NAVSUP activities there are approximately 10,000 on board personnel as of FY90. Of this number, nearly 3400 are scientists and engineers, or about 33 percent of the total workforce. The FY92 projected funding level for these activities combined is approximately $2.4 billion, of which $770 million (nearly 32 percent) is designated for RDT&E program support.

5. SPAWAR University Laboratories

SPAWAR provides contract oversight of four university laboratories. Each of these laboratories provides unique services primarily to Navy resource and program sponsors, to include the Office of Naval Research. These laboratories include the Applied Physics Laboratory (Johns Hopkins University), the Applied Physics Laboratory (University of Washington), the Applied Research Laboratory (Pennsylvania State University), and the Applied Research Laboratory (University of Texas).

Although no detailed discussion of the mission, resources and program work at these universities will be undertaken here, some pertinent personnel and funding data will provide insight into the combined resource posture of these institutions. As of September, 1990 there were 4,227 university people supporting DoD R&D programs. A total of 2,281 are classified as engineers and scientists, comprising approximately 54 percent of the workforce. The four university laboratories planned for $554 million in FY91 resources. The APL/JHU budget estimate of $434 million represents about 78 percent of the combined budget. The unweighted percentage of all resources allocated to technology base programs is approximately 70 percent.

6. OCNR R&D Activities

a. Naval Oceanographic and Atmospheric Research Laboratory (NOARL)

MISSION. The Naval Oceanographic and Atmospheric Research Laboratory (NOARL) is the principal corporate laboratory performing integrated research, development, test and evaluation in ocean sciences (including geosciences and mapping, charting, and geodesy), ocean acoustics, atmospheric science, and related technologies to improve and support Navy systems and operations.

PROGRAM WORK. The major program emphasis is on supporting tactical meteorology and oceanography, high

resolution acoustics, global atmospheric modeling, and mapping and charting to support Navy planning, training and weapon system performance.

PERSONNEL DATA. There are 537 employees on board, most of whom are DoD civilians. The technical workforce includes 227 scientists and engineers.

FUNDING BY SPONSOR/APPROPRIATION. The budget estimate for FY92 was $65.2 million. Major sponsors are ONT, CNO, ONR and SPAWAR, who combined for approximately $56 million in funding.

FUNDING BY CATEGORY. Approximately $61 million is spent in six RDT&E categories. For FY92, technology base program resources account for $33 million, or approximately 54 percent of the RDT&E budget for NOARL.

b. Naval Research Laboratory (NRL)

MISSION. NRL is the Navy's corporate laboratory for basic and applied research programs. NRL conducts a broadly based multidisciplinary program of scientific research and advanced technological development directed toward new and improved materials, equipment, techniques, systems, and related operational procedures for the Navy. In fulfillment of that mission, the NRL assumes primary responsibility as the Navy's principal R&D center in areas of unique professional competence upon request from appropriate Naval commands. NRL also provides for the Navy determination of

performance characteristics required of developmental and prototype devices through limited in-house engineering, test, and evaluation.

PROGRAM WORK. NRL program work includes the areas of computer science and artificial intelligence, device technology, directed energy technology, electronic warfare, enhanced maintainability, reliability, and serviceability technology, environmental effects on naval systems, space systems and technology, surveillance and sensor technology, and undersea technology.

FUNDING BY SPONSOR/APPROPRIATION. The FY92 planned budget for NRL is $667.2 million. Of this amount, $296.3 million in RDT&E resources is anticipated. The RDT&E,N estimates amount to $231 million, or about 78 percent of all RDT&E funding for the NRL. OCNR and other Navy organizations sponsor nearly 65 percent of all NRL programs.

FUNDING BY CATEGORY. Within the total FY92 RDT&E,N budget for NRL, approximately $158 million, or nearly 68 percent, is allocated to technology base programs.

G. SUMMARY

For FY92, the projected resources for the composite RDT&E community of ten in-house laboratories, four university laboratories, and nine T&E centers is approximately $3.4 billion. Projected funding for supporting the DoN technology

base programs is $993 million, which represents nearly one-third of all RDT&E funding.

III. DOD TEST AND EVALUATION

This chapter presents the purpose and scope, organization and program structure, resources and budgeting process for DoD weapons test and evaluation. The chapter begins with an overview of the DoD test and evaluation (T&E) program, including objectives, resource trends, organization structure, investment strategies and Congressional concerns. Next is a discussion of the Office of the Secretary of Defense (OSD) T&E organization, the DoD and Navy Major Range and Test Facilities Base (MRTFB) program, significant test and evaluation functions, and resource trends. Finally, this chapter provides some insight into the proposed consolidation of Navy test range facilities.

A. DOD TEST AND EVALUATION OVERVIEW

Mr. Pete Adolph, Deputy Director of Defense Research and Engineering (Test and Evaluation), recently had the opportunity to address the House of Representatives Committee on Armed Services on the subject of the DoD's test and evaluation program. His comments represent a macro assessment of current T&E support capabilities, resources, and programmatic concerns. He also provided a general budgetary outlook for major T&E programs, given the prevailing atmosphere of Congressional reductions, downsizing mandates,

RDT&E laboratory consolidation, acquisition management reform, and increasing demands for economy and efficiency of operations.

Test and evaluation supports the system acquisition process by ensuring the capability to support weapon system and advanced technology development, to assess the achievement of system performance objectives, and to determine systems effectiveness in an operational, threat induced environment. These capabilities must be fully responsive to the combined needs of the science and technology, research and development, operational test, acquisition, and product improvement communities. [Ref. 8:p. 2]

Mr. Adolph states that "the T&E infrastructure must be capable of meeting current and future T&E challenges by enabling the DoD T&E community to assess the complex and evolutionary technologies being engineered into today's weapon systems".[23] Figure 1 shows the organization of the T&E community. As the principle policy maker for weapons test and evaluation, the Deputy Director of Defense Research and Engineering (Test and Evaluation) (DDDR&E (T&E) is responsible to:

- Provide responsive management of DoD-wide T&E capability base.
- Provide a secure, safe test environment.

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[23]Ibid.

- Maintain consistency and commonality in test methodology.
- Improve test efficiency and effectiveness.
- Ensure interoperability and interconnectivity of test capabilities.
- Provide for consistency and commonality in instrumentation, targets, and threat systems.
- Support the T&E technology development program.
- Execute environmental clean-up and monitoring compliance.[24]

System test and evaluation is a large effort involving nearly 60,000 in-house and contractor personnel at the DoD T&E facilities. The annual aggregate DoD budget is about six billion dollars when the customer reimbursable (direct) costs are considered.[25] In FY91, expenditures for combined institutional operations accounted for $2.6 million and direct (user) funding added another $1.6 million. Improvement and modernization, military construction, targets, threat simulators, and operational test and evaluation programs comprised the remaining $1.8 million of allocated resources.

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[24]Ibid.

[25]Ibid., p. 3.

T&E COMMUNITY

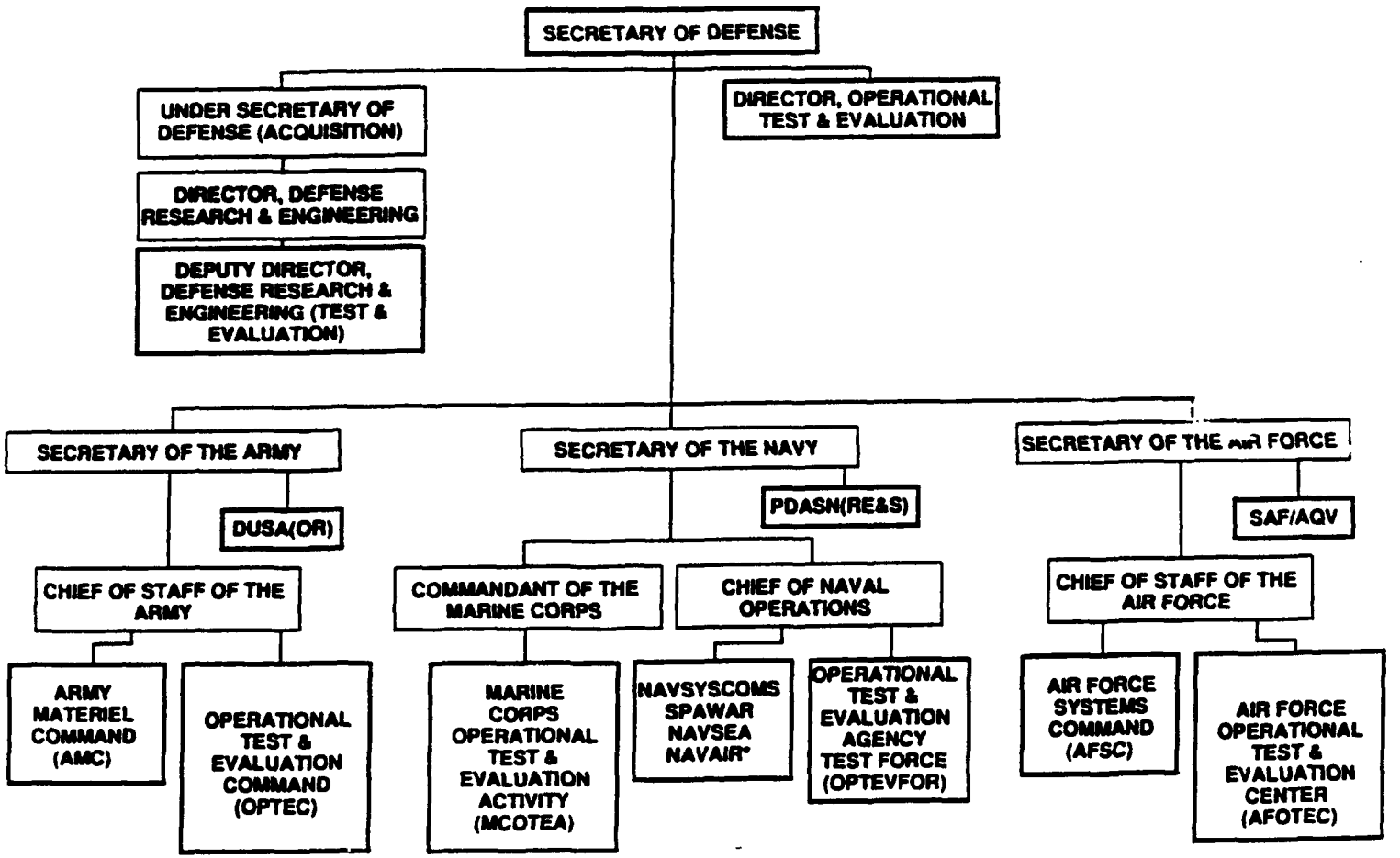

Figure 1. Organization of the T&E Community

From 1980 to 1985, RDT&E funds for both advanced and engineering development has grown 90 percent in real terms, while T&E funding had remained relatively flat.[26] Figure 2 shows the trends in RDT&E category funding from FY79-FY90.

According to Mr. Adolph the reduction to the FY90-93 T&E program was approximately $2 billion (about 16 percent), while the total RDT&E program reductions (excluding the Strategic Defense Initiative(SDI) and T&E) were only one percent.[27]

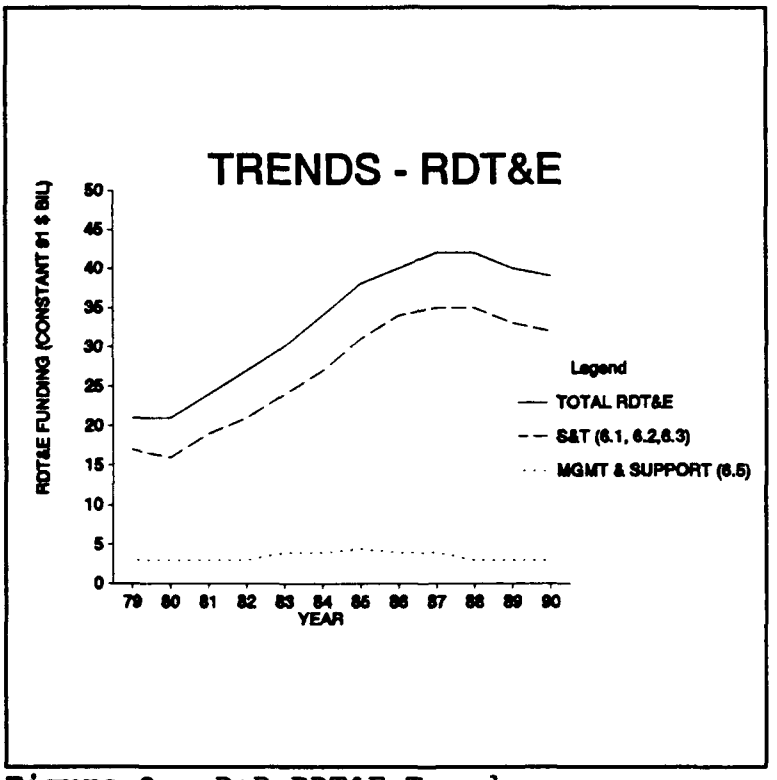

Figure 2. DoD RDT&E Trends

[26]Ibid., p. 4.

[27]Ibid.

Congress had also become critical of the DoD's depth and capability to test threat realism involved in full-scale development and test of our weapons systems. Through a robust technology base program, a significant number of more complex technologies were identified for incorporation into our weapons systems, such as stealth, kinetic and directed energy, smart munitions, and improved electronic warfare systems.

Thus, it became critical that OSD review overall T&E requirements, capabilities, organization, and available resources, to determine if these new technologies would have military applications, and be fully supportable through operational deployment. As a result, DoD initiated significant actions for the purpose of reducing the cost of operating T&E activities, and identifying duplication of tasking and overhead resources. This will be accomplished by prioritizing investment resources, consolidating test and range facilities, and improving the economy and efficiency of the MRTFB, particularly in times of declining budgets.

The impact of further Congressional reductions will result in continued aging of test and range assets, and more costly testing, due to the unaffordability of T&E improvement and modernization programs.

Within the DoN, the Director, Test and Evaluation and Technology Requirements (OP-091) has stated that a modernized test range capability is critical to the task of maintaining

"the Navy's ability to test increasingly complex weapons systems". [Ref. 9:p. 1] He also indicated that in past years, funding for new test range capabilities was included as part of the institutional budget request for each activity. In FY92, the Navy identified specific T&E modernization requirements considered essential to maintaining the test capabilities current with the projected level and nature of technology development. Funds have been separately identified and protected, to ensure that test and range instrumentation and related equipment remain state-of-the-art.[28]

B. TEST AND EVALUATION FUNCTIONS

1. Purpose

The general purpose of test and evaluation is to identify the areas of system development and acquisition risk to be reduced or eliminated. In the early phases of the system life-cycle, T&E is conducted to demonstrate concept feasibility, minimize design risks, identify design alternatives, compare and analyze tradeoffs (in terms of performance, reliability, maintainability, suitability, and affordability), and to predict operational effectiveness. As a system moves through design and development, the emphasis evolves from developmental test and evaluation (DT&E), which

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[28]Ibid., p. 2-3.

is concerned mainly with verification of design objectives and parameters, to operational test and evaluation (OT&E), which focuses on Fleet performance and operability in a near-real tactical environment. [Ref. 10:P. 1-1]

Test and evaluation provides numerous useful functions for the customer (user). These include the identification and resolution of technical problems; supporting investment and system acquisition decisions; providing information to support trade-offs between requirements and affordability; and maintaining operational data to support military doctrine, training, supportability and survivability.[29]

2. Types of Test and Evaluation

Developmental test and evaluation is defined as "that T&E conducted throughout the acquisition process to assist in engineering design and development, and to verify that technical performance specifications have been met." [Ref. 10:p. 3-1]

Operational test and evaluation determines the system's operational effectiveness and suitability, including live-fire exercises against realistic threat scenarios.

3. Test Resources

The term test resources is a collective term that encompasses all elements necessary to plan, conduct, collect and analyze data from a test event or program. These

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[29]Ibid.

elements include funding, manpower, test articles, threat simulators, tracking and data acquisition instrumentation, maintenance and repair, and base/facility support services".[30]

Figure 3 shows the location of the twenty-one activities which constitute the DoD Major Range and Test Facility Base (MRTFB), including the Navy ranges. These facilities are used to support DT&E, OT&E, and for Fleet training purposes.

[30]Ibid., p. 18-1.

MAJOR RANGE AND TEST FACILITY BASE

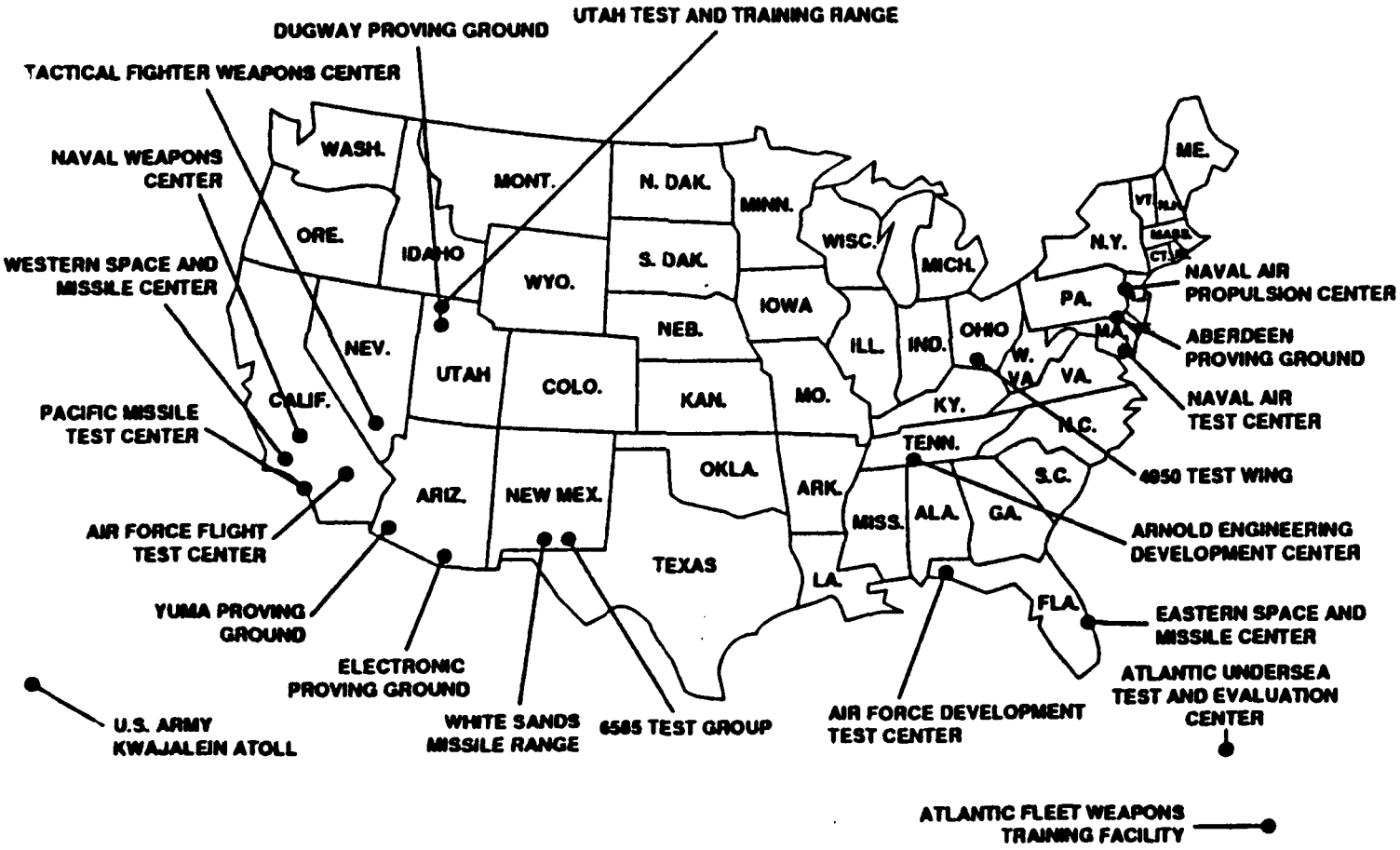

Figure 3, DoD Major Range and Test Facility Base

4. DoN MRTFB Composition

The Navy's MRTFB is comprised of the following activities and functions:[31]

a. Atlantic Undersea Test and Evaluation Center (AUTEC)

This activity, located on Andros Island, Bahamas, provides a deep-water T&E evaluation facility for making underwater acoustic measurements, testing and calibrating sonars, and providing accurate underwater, surface and in air tracking data on test participants.

b. Naval Air Propulsion Center (NAPC)

This facility, located in Trenton, New Jersey, provides complete technical and engineering support for airbreathing propulsion systems, including related accessories and components and fuels and lubricants.

c. Naval Air Test Center (NATC)

This facility, located at Patuxent River, Maryland, provides aircraft weapons systems T&E through active participation in all phases of the weapon system life cycle process.

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[31]1991 OSD Test Capability Budget and Investment Review, August 1991.

d. Naval Weapons Center (NWC)

This facility, located at China Lake, California, provides T&E for air warfare systems (except anti-submarine warfare), missile weapons systems, and parachute systems.

e. Pacific Missile Test Center (PMTC)

This facility, located at Point Mugu, California, provides all phases of engineering support for naval weapons systems and provides range, technical and base support for Fleet users and other DoD and government users.

5. Navy MRTFB Assets and Workload Indicators.

Approximately 13,000 civilian, military, and contractor personnel support the Navy MRTFB. Navy test and evaluation ranges encompass 88,000 square miles of ocean and land, and nearly 58,000 square miles of controlled airspace. Since the establishment of the MRTFB in the mid 1970's, almost three billion dollars have been invested in facilities, one-third of which are for sustaining test and operating equipment.[32]

The magnitude of the MRTFB program can be seen in a summary of workload indicators for FY91. For example, user or direct funding amounted to approximately $600 million. Adding the $317 million institutional funding, the combined MRTFB Navy budget baseline was nearly one million dollars. The combined ranges were in use for 60,000 hours, and there

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[32]Ibid.

were approximately 27,000 test and evaluation flight hours accumulated. Approximately 4,000 civilian manyears were dedicated to MRTFB support. [Ref. 11]

6. Navy MRTFB Funding

Table 2 depicts the FY91-93 Navy T&E funding by functional program, including the MRTFB. Table 3 shows the FY91 MRTFB budget allocation by range activity and expenditure category.

TABLE 2. NAVY TEST AND EVALUATION FUNDING
($ MILLIONS)

PROGRAM ELEMENT	FY90	FY91	FY92	FY93
MRTFB	$322.5	$317.0	$342.1	$335.6
THREAT SIMULATE	28.8	29.1	31.3	33.1
AERIAL TARGETS	49.6	48.5	98.0	101.3
SUB-SURF. TGTS.	27.6	4.9	17.1	17.3
ACFT/SHIP SPT.	77.3	72.3	86.3	110.2
OPTEVFOR	7.2	6.3	8.0	8.9

Source: OSD, T&E Investment Review, August 1991.

TABLE 3. MRTFB FUNDING ALLOCATION (FY91)
($ MILLIONS)

ACTIVITY	M&O	LIABILITY	I&M	ALLOC.
AUTEC	$46.4	$1.4	$2.1	$49.9
PMTC	83.6	3.3	10.6	97.5
NATC	60.1	5.1	12.0	77.2
NAPC	23.9	1.2	0.0	25.1
NWC	59.0	2.2	6.1	67.3
TOTAL	$273.0	$13.2	$30.8	$317.0

Source: OSD T&E Investment Review, August 1991.

During FY91 the Pacific Missile Test Center's portion of the Navy MRTFB budget was $97.5 million, or about 31 percent. Direct funding of $102 million, primarily from other parent user activities, increased the combined institutional and direct funding to over $200 million. Excluding the relatively small amount allocated to facility improvement and modernization (I&M) of only $10 million, the ratio of direct funding to total funding was 54 percent. This ratio has been declining at a rate of two percent per year.[33]

Navy MRTFB funding consists of two distinct categories: institutional funding and direct funding. Institutional funding is contained in program element (PE)

[33]Ibid.

605864N within the defense-wide mission support RDT&E category. This funding is provided to support, manage, and coordinate daily operations of the major T&E facilities. Historically, institutional funding has been in the range of $300-340 million annually, and represents only four percent of the RDT&E,N appropriations. Direct funding is provided from customer RDT&E resources, for supporting the test program of a particular weapon system. This source of revenue has averaged nearly $540 million annually for the past three years. Funding is expected to decline significantly with projected defense reductions.[34]

In this period of declining budgets the Navy has prioritized its MRTFB available funds to support four interactive levels of effort. These are:

- to keep current capabilities on line by funding sufficient maintenance and operating costs to retain present capabilities.
- to provide essential sustaining improvement and modernization investment costs.
- to pay above level of effort bills, to include facility lease, non-deferrable maintenance and repair, and increased locality pay.
- to develop new capabilities to include a range electronic warfare evaluation system, manned flight simulators, and a world-wide range.

By far the largest DoN T&E expenditures are for salaries. In FY91 this category totaled $137 million or 43

[34]Ibid.

percent of the total MRTFB budget. Contracts and other operating expenses totaled $148 million or 47 percent. Expenses for facility improvement and modernization, a category which is severely underfunded and rapidly declining, totaled $31 million or about 10 percent of MRTFB funding.[35]

7. Navy MRTFB Manpower

During FY91, the combined manpower supporting both institutional and direct DoN MRTFB operations was over 13,000 personnel. Approximately 64 percent supports in-house facility operations, and the remaining manyears are contracted supported.[36]

C. TEST AND EVALUATION BUDGET PROCESS

The planning, programming and budgeting system (PPBS) provides the basis for making informed affordability assessments, and resource allocation decisions on defense acquisition programs. Initial affordability goals and resource commitments are made based on best estimates of requirements, program priorities, and range capabilities.

Each phase of the PPB process is structured to provide milestone type products within an established timeframe. The end product of the planning phase is the Defense Guidance. The output from the programming phase is the Six-Year Defense

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[35]Ibid.

[36]Ibid.

Plan (SYDP), which is usually due in July prior to submission of the President's budget in January. The product of the budgeting phase is the two-year defense budget.

The T&E budgeting phase results in the SECDEF recommendations to the President, based on approved programs, budget constraints, and Program Budget Decisions (PBD). Currently, PMTC and other T&E activities, are preparing estimates for the POM-94 budget years.

D. TEST AND EVALUATION BUDGET APPROVAL CHAIN

Budgeting for T&E is simplified in terms of resource sponsorship and approval chain. Each of the Navy MRTFB activities submits its budget to the NAVAIRSYSCOM (AIR-421). These budgets are then reviewed against program information and controls, and then submitted along with all other DoN RDT&E budgets, to (OP-091). From this level the consolidated DoN RTD&E budget is forwarded to the Deputy Director Defense Research and Engineering (Test and Evaluation) (DDDR&E T&E) for approval and inclusion in the DON budget. [Ref. 11]

The DDDR&E (T&E) is responsible for setting policy regarding the structure, use, and testing requirements for the DoD MRTFB. (DDDR&E(T&E)) sets policy for the composition, use, and test program requirements of the MRTFB. [Ref. 10:Chap. 18, p. 4] This office also provides budget guidance for the Navy T&E community, in the form of resource control numbers

and programming guidance. This office also monitors T&E activities to identify duplication of capability and areas for increased cost savings and/or shortfalls.

E. MRTFB BUDGET PROCESS

Navy MRTFB funding has remained relatively stable for the past decade. Much of the budget is allocated to fixed costs, which are adjusted for inflation. This adjustment results in the establishment of topline "control numbers", which are passed from the DDDR&E (T&E) through CNO (OP-091) to the newly established Naval Warfare Centers and then down to the MRTFB activities for budget preparation. According to program managers at PMTC, the activity has until mid-January to prepare and submit its MRTFB budget.

The major claimant (NAWC-AIR 421) then reviews and consolidates all Navy MRTFB budget estimates and reclamas. The office of OP-091 then prepares the Sponsor Proposal Program (SPP) for all Navy RDT&E resource requirements, including the MRTFB. This proposal is then submitted to OSD and becomes part of the overall DoD budget for submission to the President.

According to PMTC MRTFB management, they and other MRTFB facilities have been alerted to plan for zero real growth in FY93, and to expect further reductions from current control levels in FY94-97. Final aggregate controls (FY92-97) for the Navy MRTFB program show an supposed increase from $378

million in FY92 to $415 million in FY97, which is unlikely to occur.

F. MRTFB CONSOLIDATION ACTIONS

The current DoN MRTFB structure will probably be consolidated into two range organizations. One would be designated as the NAWC-Aircraft Division, and would consist of NATC and NAPC. The other would be designated as the NAWC-Weapons Division, and would combine the NWC and PMTC. AUTEC would remain as a separate structure, as would specific funding for T&E modernization.

The purposes of consolidation are to take advantage of common overhead functions, eliminate unwarranted duplication of range development efforts, identify lead activities, and optimize any potential savings for investment in improved range capabilities.

IV. IMPACT OF BUDGET REDUCTIONS AND CONSTRAINTS

This chapter describes the Navy RDT&E budget picture in relation to the overall DoD, DoN, and RDT&E fiscal year projections. It also discusses the impacts of the 1990 Budget Enforcement Act, Defense Management Review Decisions (DMRD's), laboratory consolidation, and endstrength reductions on T&E budget formulation and execution. The chapter begins with an overview of the defense topline by function, service component, and major program. Next is an discussion of the proposed endstrength reductions, with particular emphasis on Navy personnel. Finally, this chapter provides the scope and implications of possible further reductions in defense spending, and the consolidation of Navy RDT&E facilities in response to the implementation of DMRD 922.

A. NATIONAL DEFENSE BUDGET OVERVIEW

1. Department of Defense

For 1992, the administration requested budget authority for the National Defense function (050) of $290.8 billion, increasing to $295.1 billion by FY95. Compared with FY90 funding, the proposed budget authority is lower in terms of real growth by 13 percent in FY92 and 22 percent by FY95. The percentage of DoD funds allocated to procurement and

RDT&E--the investment accounts--is 42 percent in both FY90 and FY95. Table 4 shows the proposed National Defense budget for FY90 through FY95. [Ref. 12:pp. 1-3]

TABLE 4. DOD BUDGET TOPLINE (FY92-95)
($ BILLIONS)

	FY91	FY92	FY93	FY94	FY95
DoD (051)	273.0	278.3	277.9	278.2	280.7
RDT&E (ALL)	34.6	39.9	41.0	40.1	37.5
RDT&E (NAVY)	8.3	8.2	9.5	N/A	N/A
DON (051)	92.2	91.6	92.5	N/A	N/A
DOD (050)	285.6	290.8	290.9	291.9	295.1

Source: Compiled from data provided by the CBO Testimony before the Committee on Armed Services, U.S. House of Representatives, March 1991.

The 1990 budget agreement attempted to reconcile the increasing costs of supporting defense, with the need to reduce the federal deficit and maintain current domestic programs. The FY91 President's budget for FY91-97 shows an overall reduction in defense expenditures of $410 billion, or an average of nearly $60 billion a year. These reductions were to be achieved through perceived savings in operating and management efficiencies, force structure reductions, or possible elimination of major programs. [Ref. 13]

2. Department of the Navy

Table 5 provides a comparison of the DoN RDT&E budget and the total defense RDT&E budget for fiscal years 1990-93. It also includes a comparison of the DoN and DoD budget authority for RDT&E, as well as an indication of the real growth in individual accounts and program titles. [Ref. 14]

TABLE 5. DOD RDT&E BUDGET TOPLINES (FY92/93)
(CURRENT $ BILLIONS)

BUDGET AUTH	FY90	FY91	FY92	FY93
DoD (051)	$293.0	$273.0	$278.3	$277.9
DoD (RDT&E)	36.5	34.6	39.9	41.0
% Real Growth	-6.7	-9.1	11.3	-0.9
DoN (TOTAL)	100.0	92.2	91.6	92.5
% Real Growth		-12.3	-3.3	-2.9
DoN (RDT&E)	9.5	9.1	8.2	9.5
% Real Growth	-2.2	-15.6	-5.4	11.7

Source: DoD National Defense Budget Estimates for FY1992, Office of the Comptroller, March 1991.

DoD FY1992/FY1993 Budget.

The amended budget request for FY92 contained $8.2 billion for Navy RDT&E. In May 1991, the House of

Representatives Committee on Armed Services recommended budget authorization of $9.1 billion, an increase of $981 million from the Administration's budget request. The FY92 budget request for RDT&E,N, excluding committee changes, is broken down as follows: [Ref. 15:pp. 127-133]

Technology Base	$942 million	12%
Adv. Tech. Dev.	$221 million	3%
Strategic Prog.	$275 million	3%
Tactical Prog.	$5112 million	62%
Intel. and Comm.	$841 million	10%
Defensewide Mission	$802 million	10%

B. ENDSTRENGTH PROJECTIONS

Department of Defense (DoD) planned personnel reductions for FY90-95 are 871,000 personnel. This downsizing action is due not only to phased reductions in the military force structure, but to a Congressional mandate of a four percent per year reduction in the defense acquisition workforce. DoD active and selected reserve forces will be reduced by 638,000 people over the five-year period. The Navy's projected endstrength of 510,000 at the end of FY95 represents a reduction of 13 percent of total personnel downsizing. [Ref. 12:pp. 7-8]. Civilian personnel across all DoD components will be reduced by 133,000 people by the end of FY95. [Ref. 13]

There is no clear indication of the impact of these reductions on the RDT&E community, except to assume that these figures are included in the overall mandated 20 percent downsizing of the defense acquisition workforce.

C. BUDGET ENFORCEMENT ACT IMPLICATIONS

The Budget Enforcement Act of 1990 was approved by Congress in October 1990. This legislation will serve to decrease the Navy's total spending authority by over 21 percent from FY1990-1995. The effect of this drastic reduction provides the impetus behind the consolidation of both DoD and DoN RDT&E laboratories, as well as the Navy's T&E infrastructure (e.g., MRTFB facilities). [Ref. 16]

The BEA contains several provisions which are far reaching, in terms of budgeting for defense resources. First, the BEA established three year ceilings on budget authority and outlays for defense programs. It also raises the deficit targets substantially, and provides for the adjustment of these targets in response to changing economic conditions.

The discretionary portion of the budget is divided into defense, domestic, and international categories, with spending ceilings for each, for the first three years of the agreement. If defense spending remains within its cap, it will be immune from sequestration until FY94-95. Starting in FY94, these

caps are replaced by a single cap on total discretionary spending.

The Congressional Budget Office (CBO) estimates that if non-defense spending is held to zero real growth for FY94-95, then both budget authority and outlays for defense discretionary spending would have to be reduced below the levels presently projected for these years. [Ref. 17:p. 1-2] Given the political climate of an upcoming election year and increasing public demand for using the "peace dividend" to finance domestic programs or to stimulate a sluggish economy, the defense budget is likely to be subject to further reductions below the President's request for FY1994 and FY1995.

FY1994-1995 budget authority estimates for the discretionary accounts are $518.1 billion and $525 billion, respectively. If Congress decides to hold non-defense spending constant at the FY1993 levels, then the overall BA caps for defense would be limited to $279 billion and $274 billion, respectively. In comparing this scenario with the President's proposed budget, defense BA would have to be reduced by an additional $16 billion in FY94 and $24 billion in FY95. Defense outlays would also be reduced below the Administration's levels by $14 billion and $22 billion for the two years. [Ref. 17:pp. 2-5]

These reductions could be much larger if the President and the Congress decide, as early as mid-1992, to increase

spending for non-defense programs, without imposing additional taxation. Non-defense discretionary spending includes a number of highly-visible domestic programs that affect the American people in many ways. Some political and economic observers contend that improving spending for economic, social, and educational needs requires appropriation of additional funds in those accounts, as opposed to possible reductions.

The CBO concludes that even an estimated $41 billion reduction in defense BA for FY94-95 would not reduce outlays enough to satisfy the BEA ceilings.[37] Assuming that additional reductions of military personnel would be politically and economically unacceptable, given that our force downsizing is a function of still unfolding global events, CBO has suggested other alternatives. One way for defense to meet the BA reductions of $41 billion for FY 94-95 would be to reduce budget outlays (O) by approximately $79 billion, starting in FY93.[38] These options assume that drastic reductions in military personnel and investment funds are to be minimized. Other options are presented as a means of identifying the projected impact to the DoD RDT&E account starting in FY93.

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[37]Ibid., p. 2.

[38]Ibid., p. 12.

One approach to reaching this reduction in outlays would be to cut an additional 82,000 military personnel over and above the 233,000 already in the Administration's FY93-95 proposal. Under this approach, the FY93-95 investment appropriations would be cut by $60 billion in BA to meet the outlay target of $70 billion. Projected RDT&E appropriations of $19 billion, starting with a $5 billion reduction in FY93, would represent approximately 30 percent of the total reduction to the investment accounts.[39]

A second alternative assumes that reductions to BA in FY94-95 are sufficient to meet the cuts in defense outlays. Under this approach, both the operating and investment appropriations would be reduced proportionately. The operating accounts would take a larger cut of the overall reduction ($29 billion), and investment accounts would be reduced by $21 billion. The decrease in DoD RDT&E appropriations would be $6.5 billion for the two years, second to that of the procurement accounts.[40]

Under the first approach discussed above, the FY93-95 reductions to the military personnel account would be minimized at $3.3 billion. Under the second alternative, which assumes proportional cuts in all accounts starting in FY94, the Military Personnel and Operations and Maintenance,

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[39]Ibid., p. 12, 29.

[40]Ibid., p. 6, 26.

Navy (O&MN) accounts would be reduced by almost $13 billion. This figure equates to an additional reduction of 425,000 active-duty military personnel for the last two years, over and above the 142,000 already proposed by the Administration.

In order to preclude this situation, a third alternative is suggested. This approach calls for disproportionate reductions in the investment appropriations of approximately $60 billion. The operating accounts would be reduced by only $6 billion over the FY94-95 timeframe. However, the RDT&E account would be reduced by almost $19 billion over the two years.[41]

A fourth alternative assumes that RDT&E appropriations make up a growing proportion of the investment budget. This approach assumes that cuts to the larger fast-spending accounts, such as O&MN and RDT&E, would reduce the $41 billion burden on defense BA reductions projected for FY94-95. Under this approach, the defense BA reduction for FY93-95 is $62 billion. Investment appropriation reductions of $49 billion would comprise the largest share of the burden. The RDT&E portion would be almost $22 billion, of which almost $17 billion would carry over into the FY94-95 timeframe.[42]

A fifth alternative assumes that the Administration is primarily concerned with meeting the BA ceiling for defense

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[41]Ibid., p. 6-7, 28.

[42]Ibid., p. 18, 31.

appropriations in FY94-95, and does not want to incur additional reductions as early as FY93. Under this approach, the investment appropriations would be reduced by $36 billion over the two years. The RDT&E account would incur reductions of approximately $11 billion.[43]

The estimated RDT&E reductions under these five scenarios range from $6.5 billion to $22 billion. The bottom line is that, depending on the magnitude of reductions to the procurement and R&D accounts, weapon system acquisition, some research programs, and reduced procurement buys may be the result.

D. CONGRESSIONAL BUDGET IMPACTS

Passage of the Defense Authorization Act of 1990 also had a tremendous impact on the acquisition workforce, and in particular the civilians employed at the Navy laboratories and T&E centers. With a 20 percent mandated reduction in civilian manpower over the FY91-96 timeframe, the objective now became how to downsize the RDT&E establishment, and still preserve the Navy's core mission capabilities. Fortunately the Navy had already taken the initiative to streamline the R&D and acquisition management functions, and to implement actions designed to achieve efficiency of operations. [Ref. 16]

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[43]Ibid., p. 19, 32.

Congressional actions in the past have had a significant impact on RDT&E resource funding and resultant support capability. Figure 4 shows a net reduction of RDT&E funds for FY86-92, of almost $2 billion dollars. For FY90-92, the total requested dollars was $8.7 billion. The amount appropriated by Congress was $ 7.5 billion, which represented an average annual reduction of 12 percent.[44]

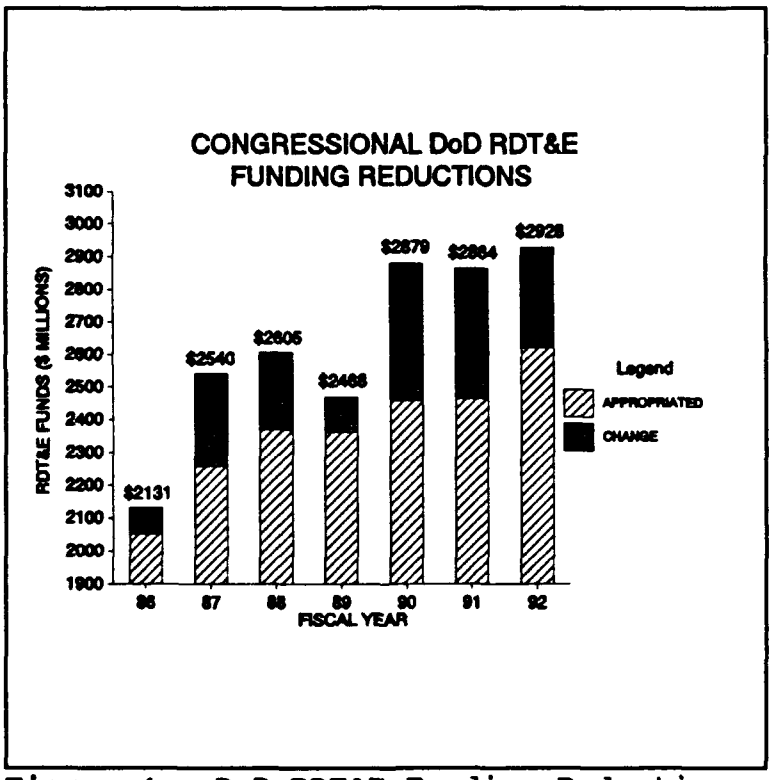

Figure 4. DoD RDT&E Funding Reductions

Major impacts of these reductions on the Navy MRTFB community include delays in improvement and modernization

[44]Source is briefing papers by John V. Bolino, Director, Test Facilities and Resources, OSD, undated.

projects, reduction in administration costs, reduced contractual support, stand down of selected test capabilities and a reduction in civilian labor. The projected impact on the MRTFB customer will probably be degraded test capabilities, an increase in costs, and less flexibility in range scheduling.[45]

E. DEPARTMENT OF DEFENSE MANAGEMENT REVIEWS

In 1989, the President requested a overall review by the DoD of the actions needed to improve management practices, and the ways in which the Department conducted its business. In a period of austere budgets, this initiative was meant to explore ways in which savings could be realized in everyday operations, while maintaining the capability to support DoD programs and acquisitions. [Ref. 19:p. 1]

The result of this analysis was the issuance of a series of Defense Management Review Decisions (DMRD's), which identified $70 billion in savings to be incorporated into the service budgets for FY1992-1997.[46]

F. NAVY LABORATORY CONSOLIDATION

The most significant impact on the RDT&E,N community was DMRD 922. This decision directed all the services to make plans to consolidate their RDT&E facilities internally, as

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[45]Ibid.

[46]Ibid.

well as explore ways in which the services can provide integrated support capabilities for historical RDT&E programs and test and evaluation requirements. [Ref. 16]

In August 1990, the Secretary of the Navy (SECNAV) initiated consolidation planning efforts by forming an RDT&E Facilities Consolidation Working Group. This group was chartered to look at all Navy activities that budgeted and executed RDT&E funds.[47]

The primary goal of the consolidation planning was to "preserve essential capability, in terms of unique facilities, engineering and technical skills, and critical technology". [Ref. 18:p. 22] The study initially included 76 candidate activities, which was eventually reduced to 34 activities. These remaining activities were evaluated for possible alignment under a warfare center, or restructuring of their RDT&E charter and workload. These activities have a total business base of $9.1 billion, including $3.3 billion designated for RDT&E programs. Of this amount, RDT&E,N resources of $2.8 billion comprise approximately 31 percent of all DoD RDT&E funding.[48]

In December 1990, SECNAV adopted the Working Committee's concept of forming four warfare centers and one DoN Corporate Laboratory (NRL). Under this proposal, each of the Centers

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[47]Ibid.

[48]Ibid., p. 24-25.

would be responsible for managing several laboratories, T&E activities, and other Fleet support activities. Also, each Center would have a specific mission and be responsible for a set of functional leadership areas. The importance of this consolidation is that effective 1 October 1991, DoN program managers must direct their T&E work to that warfare center which is responsible for supporting that particular group of functions. The primary purpose of the consolidation, in addition to reacting to mandated personnel reductions, is to purify the activity missions and eliminate costly and inefficient duplication of effort. A second purpose is to create centers of technical excellence, by concentrating workloads and a critical mass of talent within a given technical area, and at specific facilities. This is a phased plan which started in FY1991 and is expected to be completed by 1995. [Ref. 16]

Figures 5 through 9 show the consolidation structure of the four warfare centers.[49] These charts display the mission, RDT&E, engineering, and Fleet Support activities, and approved functional leadership areas.

The consolidation effort is expected to produce $1.1 billion in savings through FY97. The Navy portion of this savings is projected at approximately $122 million over the

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[49]Ibid.

next six years. This funding has already been taken out of the Navy RDT&E budget.

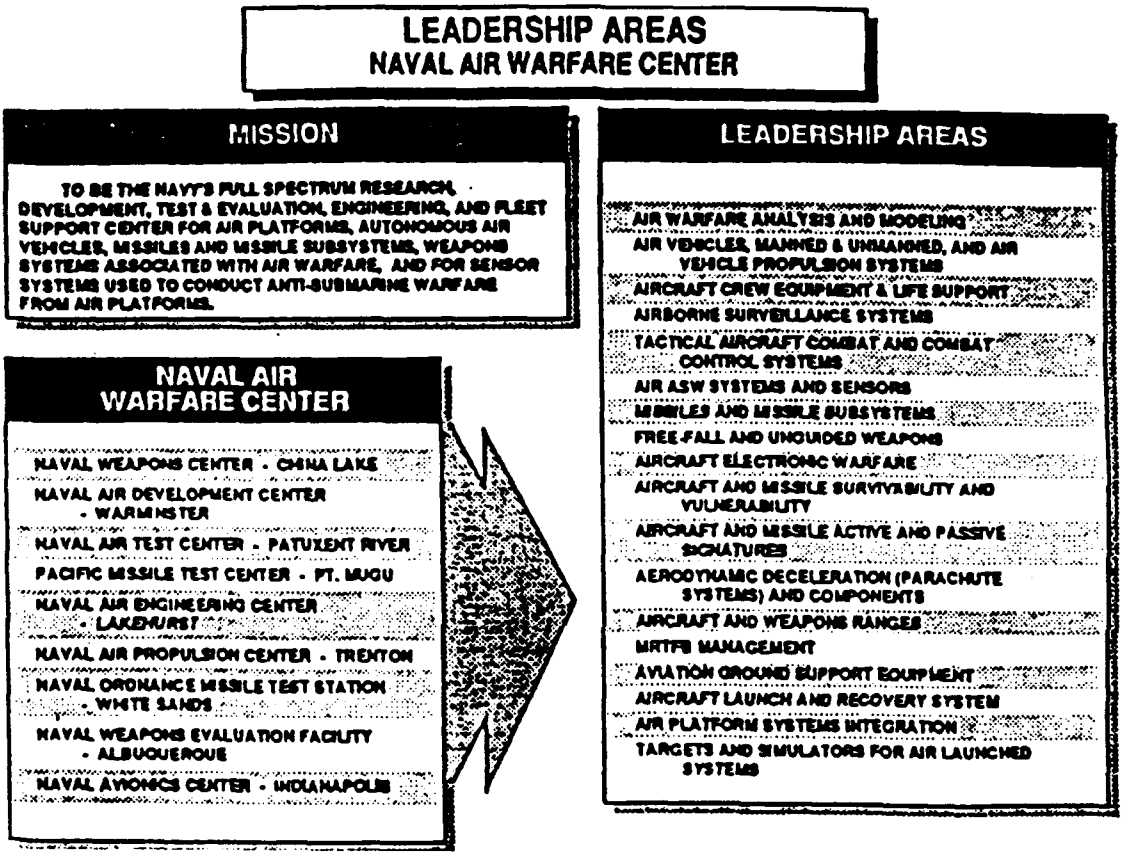

Figure 5. Naval Air Warfare Center

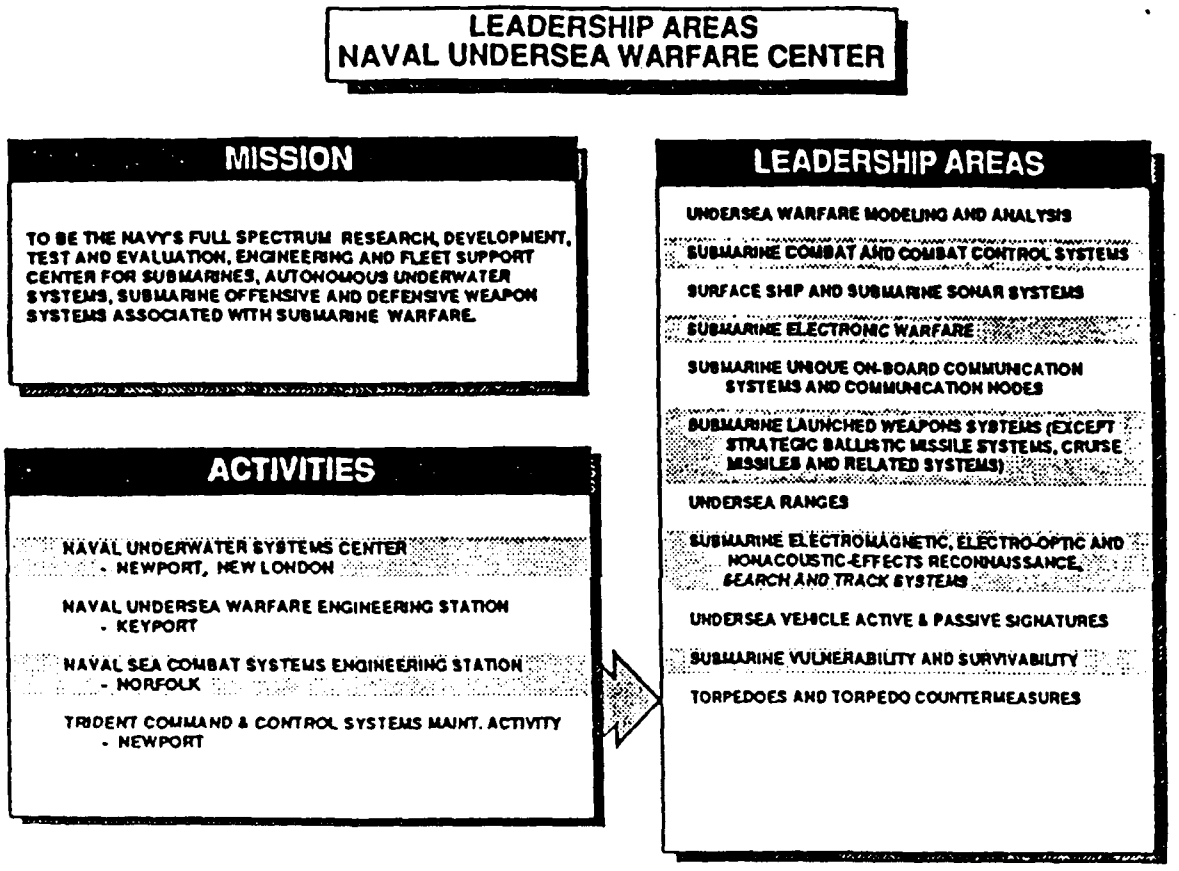

Figure 6. Naval Undersea Warfare Center

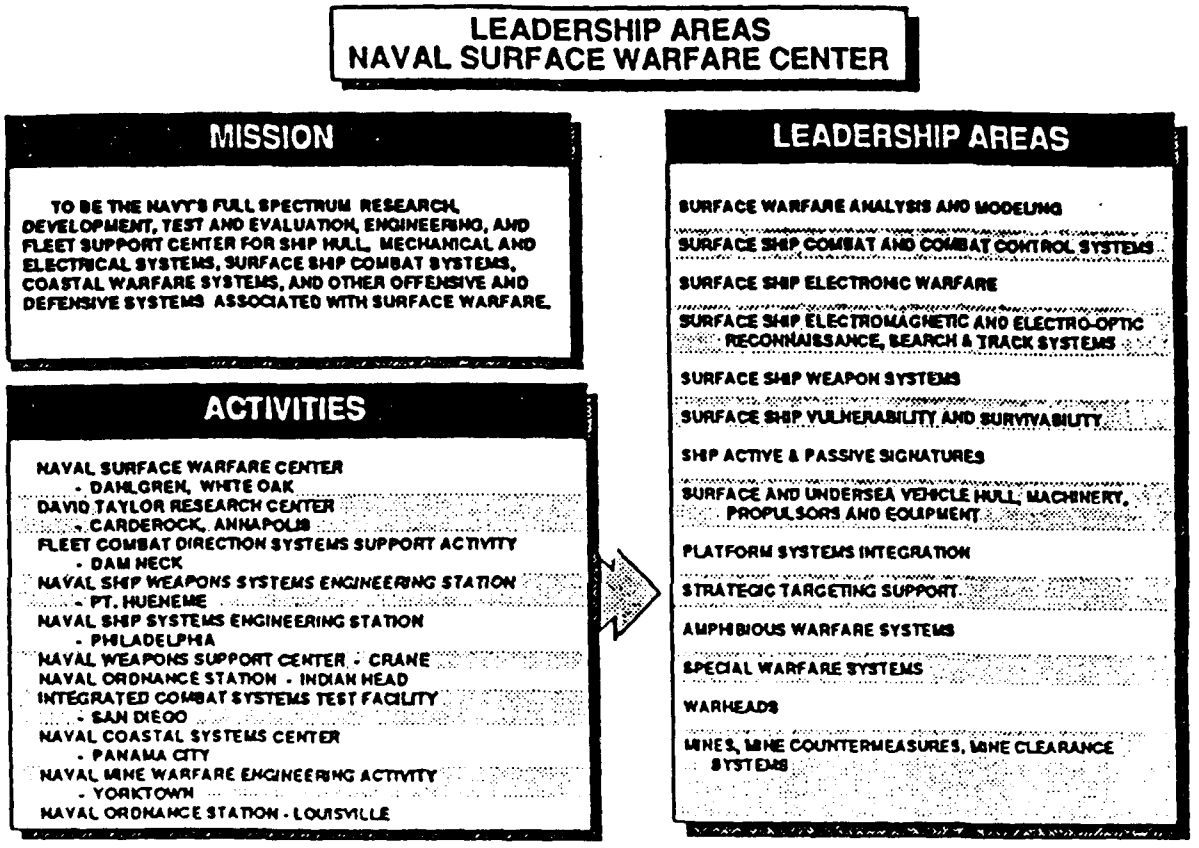

Figure 7. Naval Surface Warfare Center

Figure 8. Naval Command, Control & Ocean Surveillance Center

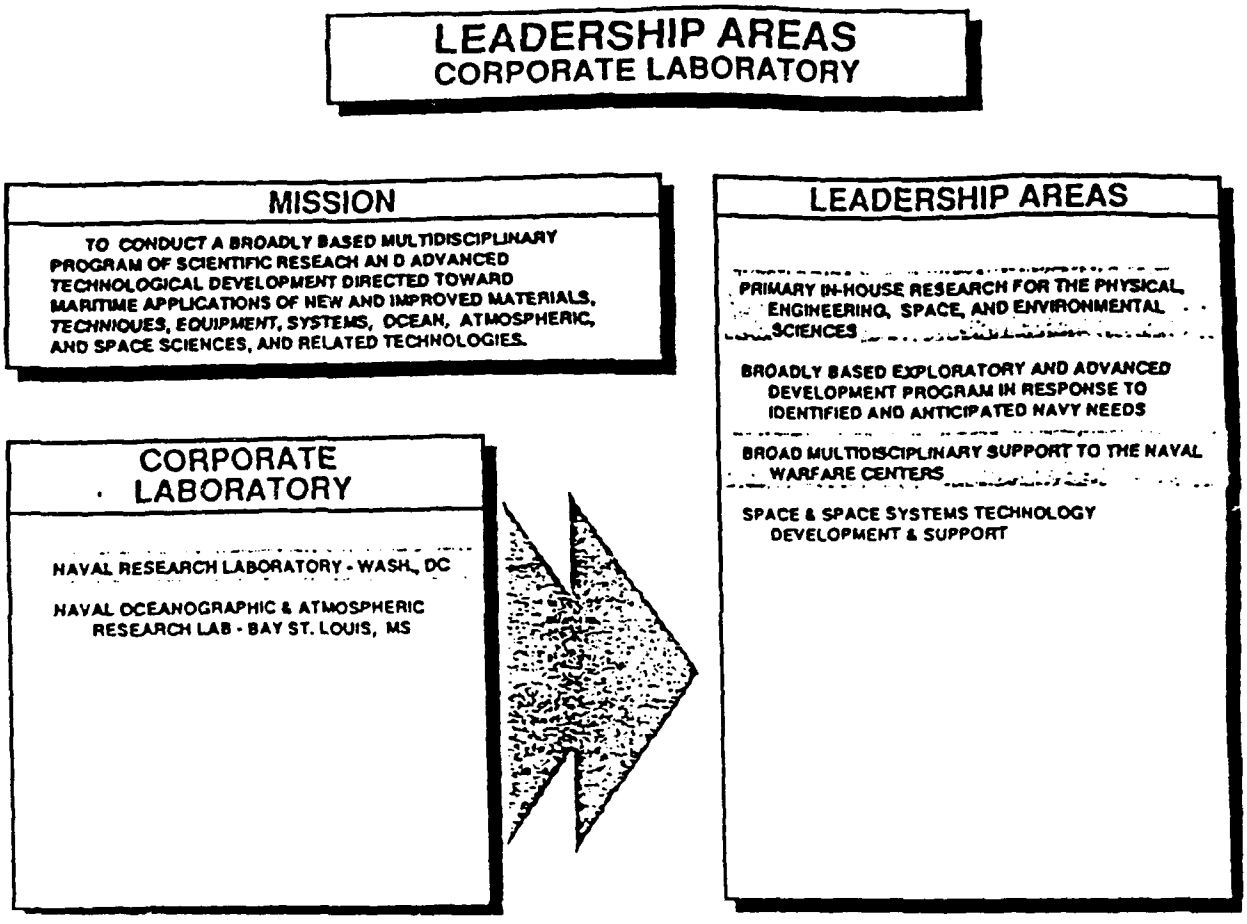

Figure 9. Naval Corporate Laboratory

V. CONCLUSIONS AND RECOMMENDATIONS

This chapter offers conclusions about the current organization structure, technical capabilities, budget health, and potential problems confronting the Department of Defense (DoD) and the Department of the Navy (DoN) research, development, test and evaluation program. It provides some general discussion and recommendations regarding management oversight and initiatives which should be addressed to ensure preservation of the Navy's core RDT&E capabilities.

Notwithstanding the turbulent global situation, and the uncertainty as to the nature of future conflicts to be prepared for, the DoD is resolved to supporting established warfare missions and strategies, even in the face of sharply declining defense resources.

A. CONCLUSIONS

The DoD has successfully established and funded a complex, but sound Science and Technology program for the past four decades. The proven ability of the laboratories to build a comprehensive and dynamic technology base that allows for transition of innovative research into weapons acquisition requirements, and then to weapons test and evaluation in an operational threat environment, is second

to none in the world. Historically, the DoN has maintained a forward-looking investment in technology application for most of its weapons programs. The overwhelming success of this approach has been evident in nearly all historical conflicts, and most recently in the Persian Gulf. The goal of maintaining the technological edge over our long-standing adversaries and other emerging regional threats, has been fully achieved.

However, unlike the previous era of unconstrained budgets, there are strong political and economic influences affecting the future of the RDT&E program. As service budgets drop and Congress intervenes with vertical program cuts, the temptation to divert RDT&E resources to fund other activities is being tested. In this situation, Navy resource and program sponsors may attempt to re-program scarce dollars to meet requirements in other accounts, and reduce the risk of funding technology base programs, which show limited near-term application.

This atmosphere of declining, or unstable, budgets will probably continue throughout the decade. A recent newspaper article stated that "senior civilians at the Pentagon have been plotting the directions the U.S. military would take if Congress were to demand further cuts of as much as $50 billion by the latter half of the 1990's."[50]

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[50]The Monterey Herald, Subj: Pentagon exploring bigger spending cuts, November 25, 1991.

DoD had originally planned for an average annual real reduction of two percent for FY92-97. However, in FY94-95 it appears that the DoD will likely have to bear the additional burden of anticipated outlay reductions.

Continued base closures, additional downsizing actions, and the ongoing consolidation of Navy laboratories and test and evaluation centers, may lead to a disruptive reduction-in-force, as well as some degradation of capabilities. If this occurs, the Navy stands to lose a sizeable number of highly-trained civilian technicians and scientists with extensive experience in test and evaluation operations.

Consolidation of Navy laboratories will prove to be unsettling for the RDT&E community in the near future. Even though separate warfare centers have been designated and specific missions assigned, the availability of quality personnel and adequate funding to support major programs remains questionable. Also, by aligning the RDT&E activities under the four SYSCOMs, there is concern that the technology base programs will be driven by their parent resource and program sponsors, as opposed to innovative research and development which is joint-service oriented.

Additionally, the DMRD initiatives to produce savings of approximately $70 billion in improved management and operating efficiencies is highly speculative.

The principal conclusion made is that DoD finds itself having to plan for real budget reductions, even though the

overall national security strategy and defense missions are still being formulated. The DoD is being seriously challenged to balance force and technology requirements with affordability within a long-term budget planning process. The FY92 DoD RDT&E budget actually provides a nominal increase in outlay spending.

For the 1992-1997 period, it appears that most of the President's budget is structured towards increasing reductions in the operations and maintenance, military personnel, and procurement accounts. These cuts will most certainly lead to massive layoffs of personnel, which would be particularly difficult for the test and evaluation community. Even though less than three to four percent of the total RDT&E budget is for T&E, this program is the most important in terms of determining whether a system should be acquired, and what performance and maintainability levels can be expected by Fleet operational units.

If additional cuts become reality, then the question of where to absorb the burden becomes one which must be thought out by all stakeholders. For example, DoD could budget for more personnel reductions, or opt for additional cuts in the procurement and RDT&E programs.

The future of the Navy's weapons development and test programs will be highly dependent on the amount and stability of resources available to support the in-house laboratories and the MRTFB facilities. With this premise,

some general recommendations are offered as a means of further addressing the reconciliation of shrinking budgets with an efficient RDT&E support capability.

B. RECOMMENDATIONS

The technologies incorporated in our future and current weapon systems will continue to be developed and advanced through the R&D programs. However, the process of advancing new technologies into military hardware needs will be very selective, and budget constrained. The DoN must become more interactive in developing and marketing their T&E requirements, and in prioritizing their resources. The Navy will probably invest little in the basic and applied research programs and more in the exploratory and advanced development programs.

Additionally, since T&E is under the RDT&E,N umbrella, there are some serious concerns that T&E budgets will be underfunded, and particularly impacted by the decrease in direct (program user) funding. Because of this situation, the DDDR&E now has greater oversight responsibility for forcing the services to support a robust technology base and follow-on test and evaluation.

The DoN needs to ensure that test and evaluation programs and activities, which comprise three to four percent of the RDT&E,N budget, are not allowed to drop below a threshhold necessary to sustain the required capabilities.

It is further recommended that Navy T&E program managers increase their efforts to determine the scope and direction of new system and test technology. Early involvement in the weapons development phase is essential in these times to ensure that test facilities and unique test equipment is available.

The Navy MRTFB planning offices must continue their efforts to quantify test facility utilization, identify cost-cutting initiatives, eliminate duplicative functions, and project the availability of resources other than MRTFB institutional funds. This effort should allow for assessing minimal support requirements, better long-term planning, identification of technology and equipment shortfalls, and possible areas for T&E facility improvements.

It is recommended that the DoN continue to review the full impact of the consolidations actions, Defense Management Review initiatives, and mandated personnel reductions on DoN RDT&E programs. All of these directives are being driven by either cost-savings and improved efficiencies, program cuts, or across-the-board personnel reductions. However, some of these actions are valid candidates for reclama. There is a point at which further reductions impact the Navy's ability to provide the kind of support necessary for the complexity of new weapons systems.

The Navy needs to argue for greater budget stability, both in the laboratories and in the T&E community. DoD must also attempt to reverse the trend of imposing budget cuts on the services, and then asking what level and quality of support can be provided for that amount of dollars. Even with Congressional micromanagement of DoD programs and budgets, and the pressure to use this peace dividend to support domestic program spending, the need to fully fund a world-wide, modernized and sustained test and evaluation program must drive the planning function.

Finally, the Navy should continue to assess the overall impact of laboratory restructuring and base closures on the quality and availability of the workforce. Much attention seems to be focused on the mechanics of the effort, as opposed to the support capability and management efficiencies which it was designed to achieve.

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